

Development of Advanced Anti-Reflection Coatings for High Performance Solar Energy Applications, Phase II

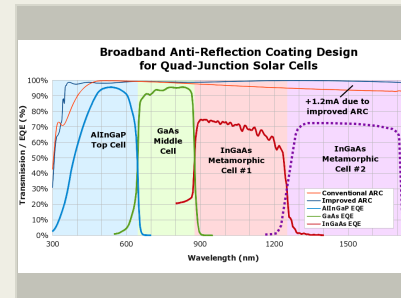
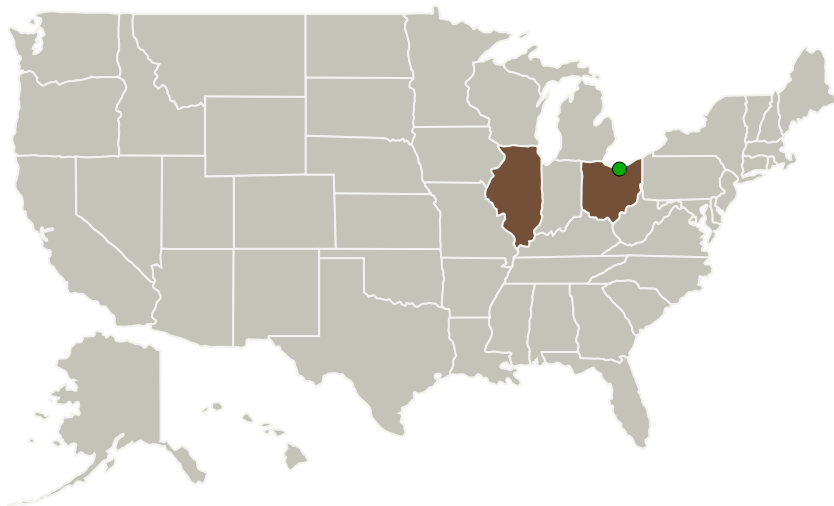
Completed Technology Project (2014 - 2017)



Project Introduction

MicroLink Devices will increase the efficiency of multi-junction solar cells by designing and demonstrating advanced anti-reflection coatings (ARCs) that will provide a better broadband spectral response than that of conventional anti-reflection coatings. Advanced coatings of this nature are needed to realize the full performance of the forthcoming generation of multi-junction solar cells, which will contain four or more junctions. Two approaches to improving the performance of the antireflection coatings will be investigated: * develop multilayer dielectric antireflection coatings incorporating LaTiO₃ to achieve significantly improved optical coupling between the coverglass and cell at the ultraviolet and infrared ends of the spectral range of interest; and * develop a structure and corresponding fabrication process to oxidize the Al-containing window layer in order to reduce the absorption of light at the short-end of the spectral range of interest, thus providing extra useable photons to the cell. These two technologies will be integrated into a hybrid design which will provide the best possible coupling of light from cover glass to cell in order to achieve the highest possible efficiency in next-generation devices containing four or more junctions. It is expected that the new coatings will enable a relative efficiency increase of at least 7%, corresponding to a 2.5% absolute efficiency increase. The reliability and radiation tolerance of these materials and the solar cells incorporating the new designs will be tested.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
MicroLink Devices, Inc.	Lead Organization	Industry Minority-Owned Business	Niles, Illinois
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

Illinois	Ohio
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Project Transitions

▶ **April 2014:** Project Start

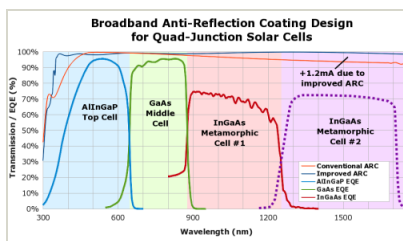
✓ **June 2017:** Closed out

Closeout Summary: Development of Advanced Anti-Reflection Coatings for High Performance Solar Energy Applications, Phase II Project Image

Closeout Documentation:

- Final Summary Chart Image(<https://techport.nasa.gov/file/137459>)

Images



Briefing Chart Image

Development of Advanced Anti-Reflection Coatings for High Performance Solar Energy Applications, Phase II
(<https://techport.nasa.gov/image/130352>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

MicroLink Devices, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

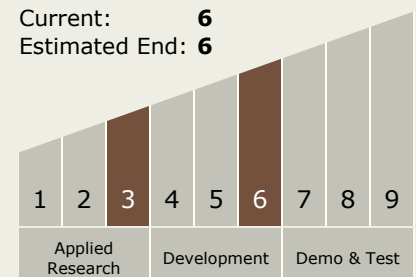
Carlos Torrez

Principal Investigator:

Victor C Elarde

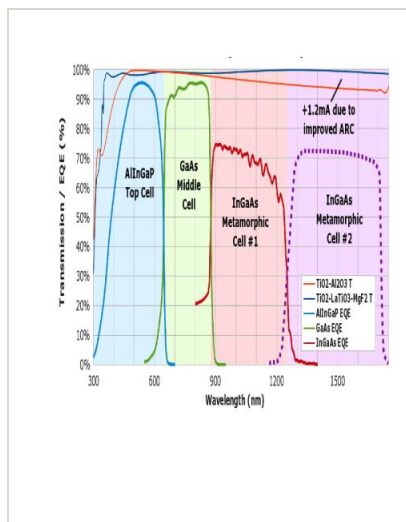
Technology Maturity (TRL)

Start: **3**
Current: **6**
Estimated End: **6**



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Final Summary Chart Image

Development of Advanced Anti-Reflection Coatings for High Performance Solar Energy Applications, Phase II Project Image

(<https://techport.nasa.gov/image/129291>)

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.1 Power Generation and Energy Conversion
 - └ TX03.1.1 Photovoltaic

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System